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IS 12204 (1987): Code of practice for selection of reciprocating feeders [MED 6: Continuous Bulk Conveying, Elevating, Hoisting Aerial Ropeways and Related Equipment]

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Indian Standard

CODE OF PRACTICE FOR SELECTION OF RECIPROCATING FEEDERS

Conveyors, Vertical Hoists and Bucket Elevators Sectional Committee, EDC 61; Feeders Subcommittee, EDC 61 : 9 [Ref : Doc : EDC 61 (2982)]

1. Scope — Lays down the code of practice for the selection of reciprocating feeders.

2. Application — Reciprocating feeders are used extensively under track hoppers and bins to handle ores, sand, stone, coal and many other non-sticky or non-adhering materials where a slightly intermittent discharge is not objectionable. These require a minimum of head room and are designed to handle large capacities and large lumps without difficulty.

3. Material

3.1 *Body* — Steel plates conforming to IS : 226-1975 'Specification for structural steel (standard quality) (*fifth revision*)'.

3.2 *Shafts* — In accordance with IS : 9550-1980 'Specification for bright bars' or 45 C 8 of IS : 1570 (Part 2)-1979 'Schedule for wrought steels: Part 2 Carbon steels (unalloyed steels) (*first revision*)'.

3.3 *Roller* — Conforming to Grade 2 of IS : 9644-1986 'Specification for high tensile steel castings (*third revision*)' or 35 C 4 of IS : 1570 (Part 2)-1979 or IS : 210-1978 'Specification for grey iron castings (*third revision*)'.

3.4 *Liners* — Rubber or steel having wear resistance property, depending upon the material handled.

4. Capacity — The capacity depends on the size of opening, the speed of feeder and the throw of the eccentric. Recommended dimensions and capacities of different sizes of reciprocating feeders are listed in Table 1 read with Fig. 1.

5. Construction — Reciprocating feeder consists essentially of a pair of stationary skirt plates attached to a bin or hopper beneath which a roller supported plate operates. An illustration is given in Fig. 1. Reciprocating motion is imparted to the bottom plate by means of a disc crank through a connecting rod. The number of disc crank(s) and connecting rod(s) may be one or two (left hand and right hand) depending on the size of the feeder. The speed of crank may be between 10 to 75 rev/min. Large diameter rollers provided at the bottom, support the pan loader and allow free reciprocating movement of the pan (bottom plate). The bottom plate may be declined to reduce accumulation of the material. During operation, material flowing from a storage bin or hopper comes to rest on the feeder plate and is restrained from continued flow by the skirt plates and its natural angle of repose. As the reciprocating plate moves forward, it carries with it the material resting upon it. Simultaneously as the plate and material move forward, other material flows into the vacant space at the rear of the feeder. On the return stroke, the bottom plate slides beneath the material since the backward movement of the material is restrained by the new material which filled the space created on the forward stroke. As the cycle is repeated, material is fed from the bin or hopper on the forward stroke and discharged from the feeder on the return stroke. The drive may be by chain and sprocket or by spur or worm gearing or the eccentric may directly be mounted on the output shaft of the gear box or could be through a counter-shaft which is connected with the reducer by suitable coupling. High torque motors are recommended for the drive. Depending upon the layout, the feeder may be suspended or base mounted type. Flopper gate may be provided if required by the purchaser.

6. Selection Criteria

6.1 Apart from the details given in **2** to **5**, the following parameters shall also guide the selection of a suitable feeder:

a) Controls for the feed;
b) Speed (rev/min);
c) Feeder lengths; and
d) Selection of motor, its rating for required selected speed (rev/min) and feeder lengths.

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TABLE 1 RECOMMENDED DIMENSIONS AND CAPACITIES OF RECIPROCATING FEEDERS

(*Clause* 4 and *Fig.* 1)

All dimensions in millimetres.

Nominal Size (Feeder Width), *W*	Maximum Lump Size	Depth of Material *D*	Stroke, *S*	Capacity t/h	Recommended Motor kW
500	150	400	150 200 250	65 90 110	5·0
630	250	600	150 200 250	130 175 220	7·5
800	300	750	150 200 250	215 290 360	7·5
900	375	900	150 200 250	300 400 500	12·5
1 000	450	1 100	150 200 250	450 600 750	12·5
1 250	500	1 350	200 250 300	720 900 1 075	15
1 600	650	1 600	200 250 300	950 1 190 1 425	18·5
1 800	750	1 800	200 250 300	1 150 1 440 1 725	18·5
2 000	900	1 800	200 250 300	1 500 1 875 2 250	22

Note 1 — The above capacities have been calculated for a material with 1·0 t/m^3 bulk density and a speed of 50 rev/min.

Note 2 — Motor ratings are based on a feed speed of 50 rev/min and feeder length of 2 m for feeders of nominal sizes up to 1 000 mm and 3 m for feeders of nominal size 1 250 mm and above.

Note 3 — Stroke *S* in the table is only recommendatory and there may be provision for varying the stroke from 30 to 300 mm depending upon the material handled.

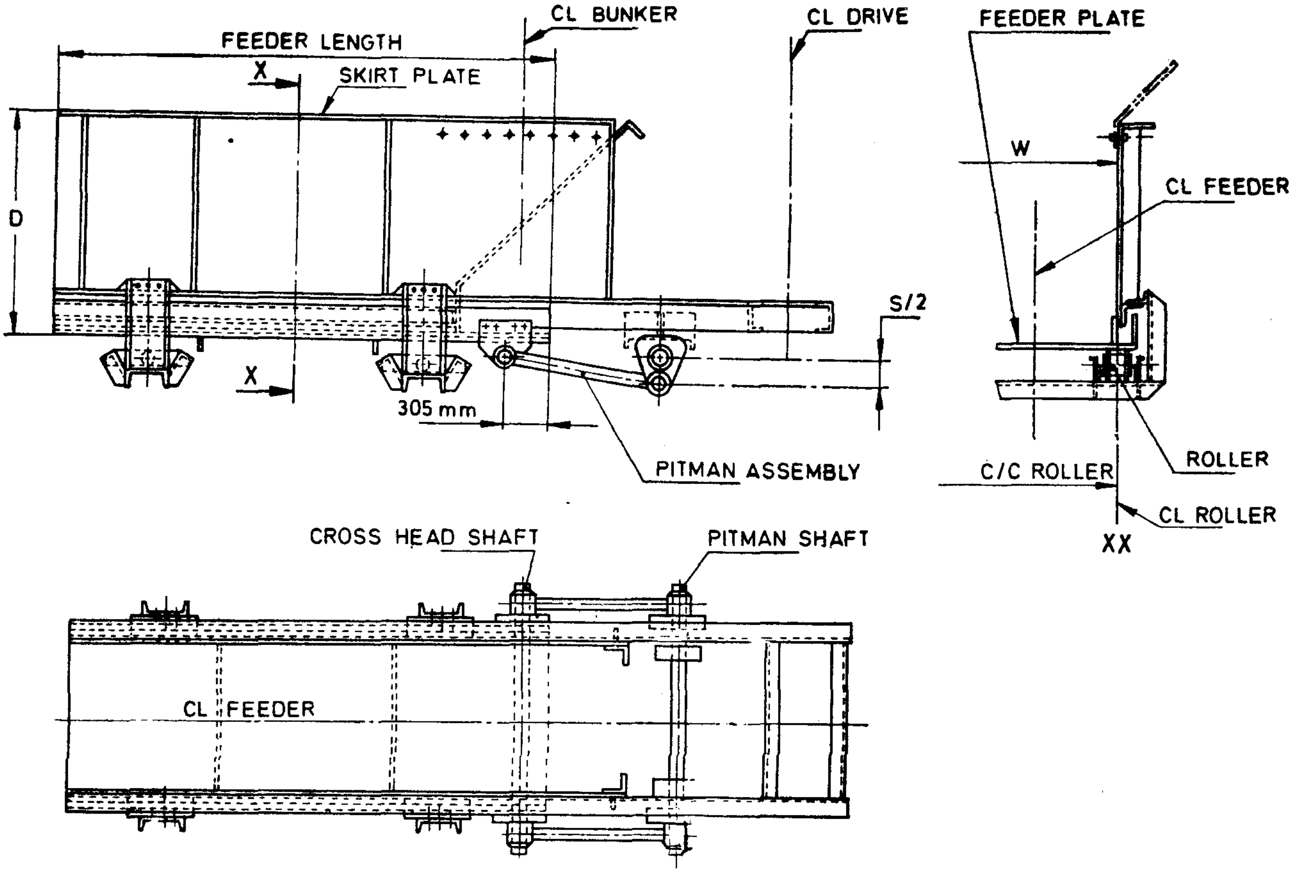

FIG. 1 RECIPROCATING FEEDER ILLUSTRATION

6.2 While calculating the capacity of the feeder, width to be taken in the calculations may be the effective width between skirt boards. The width of the feeder pan may be more than this effective width. Further, in the calculation of capacities, the effective cross-section of the load on the pan is important. In the calculation of the power rating of the motor, it may be essential to ascertain the bunker opening and the consequent bunker burden, that is the material load that comes directly on the pan. This depends on the bunker mouth opening and the average height of the material in the bunker. These factors may be ascertained once the maximum opening of the bunker is known. Also, consideration may be given for effect of the column loads on the skirt boards and the amount of frictional drag during forward as well as during the return stroke. For proper operation of the feeder, it is necessary that the friction between the material and the bottom pan shall be much more than the friction between the skirt boards and the material. This may ensure effective propulsion of the load in forward direction. Generally, a slope of about five degrees is given to the pan for self cleaning action at the end of the operation.

7. Data to be Supplied by the Purchaser and the Manufacturer — For the guidance of the manufacturer, the purchaser shall furnish a list of relevant data of the feeder required by him. Similarly, to enable the purchaser to select a suitable feeder, the manufacturer shall furnish the relevant data about the feeder manufactured by him.

EXPLANATORY NOTE

This standard is based on the information available from the manufacturers and the users organizations of reciprocating feeders. The criteria for selection of reciprocating feeders given in this standard are expected to provide suitable guidelines to the manufacturers while designing and manufacturing and to the users while selecting the reciprocating feeders for their requirements. The requirements which are not specified for quality of materials and components, and durability aspects may be agreed to between the purchaser and the manufacturer.

IS : 11592-1985 'Code of practice for selection and design of belt conveyors', may be a useful reference to help selecting the feeder regarding some of the aspects not covered in this standard.

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